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**In the Claims:**

**Claim 1 (currently amended):** A noise attenuation system for speech coding comprising:

an encoder disposed to receive a digitized signal, the encoder to provide a bitstream based upon a speech coding of the digitized signal;

where the speech coding determines at least one gain scaling a portion of the digitized signal; and

where the encoder adjusts the at least one gain as a function of noise characteristic for attenuating background noise in at least one frame.

wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

**Claim 2 (original):** The noise attenuation system according to Claim 1, where the speech coding comprises code excited linear prediction (CELP).

**Claim 3 (original):** The noise attenuation system according to Claim 1, where the speech coding comprises extended code excited linear prediction (eX-CELP).

**Claim 4 (original):** The noise attenuation system according to Claim 1, where the at least one gain is adjusted prior to quantization by the speech coding.

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**Claim 5 (currently amended):** The noise attenuation system according to Claim 1, where the encoder adjusts the at least one gain according to  $G_f$  the gain factor.

**Claim 6 (original):** The noise attenuation system according to Claim 5, where the gain factor  $G_f$  is determined by the equation,

$$G_f = 1 - C \cdot \text{NSR}$$

where NSR has a value of about 1 when the portion comprises essentially background noise, where NSR is the square root of background noise energy divided by signal energy when the portion comprises speech, and where C is in the range of 0 through 1.

**Claim 7 (original):** The noise attenuation system according to Claim 6, where C is in the range of about 0.4 through about 0.6.

**Claim 8 (original):** The noise attenuation system according to Claim 6, further comprising a voice activity detector (VAD) operatively connected to the encoder, the VAD to determine when the portion comprises speech.

**Claim 9 (original):** The noise attenuation system according to Claim 5, where the gain factor is based on a running mean.

**Claim 10 (original):** The noise attenuation system according to Claim 9, where the running mean  $G_f$  new is determined by the equation,

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$$Gf_{\text{new}} = \alpha \cdot Gf_{\text{old}} + (1 - \alpha) \cdot Gf_{\text{current}}$$

where  $Gf_{\text{old}}$  is a preceding gain factor for a preceding portion of the digitized signal, where  $Gf_{\text{current}}$  is the gain factor based on the portion of the digitized signal, and where  $0 \leq \alpha < 1$ .

**Claim 11 (original):** The noise attenuation system according to Claim 10, where  $\alpha$  is equal to about 0.5.

**Claim 12 (original):** The noise attenuation system according to Claim 1, where the portion of the digitized signal is one of a frame, a sub-frame, and a half frame.

**Claim 13 (original):** The noise attenuation system according to Claim 1, where the encoder comprises a digital signal processing (DSP) chip.

**Claim 14 (original):** The noise attenuation system according to Claim 13, further comprising a preprocessor operatively connected to receive the digitized signal from the analog-to-digital converter, the preprocessor to modify spectral magnitudes of the digitized signal to reduce noise, the preprocessor to provide a noise-suppressed digitized signal to the encoder.

**Claim 15 (original):** The noise attenuation system according to Claim 1, further comprising a decoder operatively connected to receive the bitstream from the encoder, the decoder to provide a reconstructed signal based upon the bitstream.

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**Claim 16 (currently amended):** A noise attenuation system for speech coding comprising:

a decoder disposed to receive a bitstream, the decoder to provide a reconstructed signal based upon a speech decoding of the bitstream;

where the speech decoding determines at least one gain scaling a portion of the reconstructed signal; and

where the encoder adjusts the at least one gain as a function of noise characteristic for attenuating background noise in at least one frame.

wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

**Claim 17 (original):** The noise attenuation system according to Claim 16, where the speech decoding comprises code excited linear prediction (CELP).

**Claim 18 (original):** The noise attenuation system according to Claim 16, where the speech decoding comprises extended code excited linear prediction (eX-CELP).

**Claim 19 (original):** The noise attenuation system according to Claim 16, where the at least one gain is adjusted after decoding by the speech decoding.

**Claim 20 (currently amended):** The noise attenuation system according to Claim 16, where the decoder adjusts the at least one gain according to ~~[[a]]~~ the gain factor.

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**Claim 21 (original):** The noise attenuation system according to Claim 20, where the gain factor  $G_f$  is determined by the equation,

$$G_f = 1 - C \cdot \text{NSR}$$

where NSR has a value of about 1 when the portion comprises essentially background noise, where NSR is the square root of background noise energy divided by signal energy when the portion comprises speech, and where C is in the range of 0 through 1.

**Claim 22 (original):** The noise attenuation system according to Claim 21, where C is in the range of about 0.4 through about 0.6.

**Claim 23 (original):** The noise attenuation system according to Claim 21, further comprising a voice activity detector (VAD) operatively connected to the decoder, the VAD to determine when the portion comprises speech.

**Claim 24 (original):** The noise attenuation system according to Claim 20, where the gain factor is based on a running mean.

**Claim 25 (original):** The noise attenuation system according to Claim 24, where the running mean  $G_{f\_new}$  is determined by the equation,

$$G_{f\_new} = \alpha \cdot G_{f\_old} + (1 - \alpha) \cdot G_{f\_current}$$

where  $G_{f\_old}$  is a preceding gain factor for a preceding portion of the reconstructed signal, where

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$Gf_{current}$  is the gain factor based on the portion of the reconstructed signal, and where  $0 \leq \alpha < 1$ .

**Claim 26 (original):** The noise attenuation system according to Claim 25, where  $\alpha$  is equal to about 0.5.

**Claim 27 (original):** The noise attenuation system according to Claim 16, where the portion of the reconstructed signal is one of a frame, a sub-frame, and a half frame.

**Claim 28 (original):** The noise attenuation system according to Claim 16, where the decoder comprises a digital signal processing (DSP) chip.

**Claim 29 (original):** The noise attenuation system according to Claim 16, further comprising an encoder operatively connected to provide the bitstream to the decoder.

**Claim 30 (currently amended):** A noise attenuation system for speech coding comprising:

an encoder disposed to receive a digitized signal, the encoder to provide a bitstream based upon a speech coding of the digitized signal, where the speech coding determines at least one gain scaling a portion of the digitized signal, and where the encoder adjusts the at least one gain as a function of noise characteristic; and

a decoder operatively connected to receive the bitstream from the encoder, where the decoder provides a reconstructed signal based upon a speech decoding of the bitstream, where

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the speech decoding reconstructs the at least one gain scaling the portion of the digitized signal, and where the decoder adjusts the at least one gain as a function of noise characteristic for attenuating background noise in at least one frame, wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

**Claim 31 (original):** The noise attenuation system according to Claim 30, where the speech coding and the speech decoding comprise code excited linear prediction (CELP).

**Claim 32 (original):** The noise attenuation system according to Claim 30, where the speech coding and the speech decoding comprise extended code excited linear prediction (eX - CELP).

**Claim 33 (original):** The noise attenuation system according to Claim 30, where at least one of the encoder and the decoder adjusts the at least one gain.

**Claim 34 (original):** The noise attenuation system according to Claim 30, where at least one of the encoder and the decoder adjusts the gain according to a gain factor.

**Claim 35 (original):** The noise attenuation system according to Claim 34, where the gain factor  $G_f$  is determined by the equation,

$$G_f = 1 - C \cdot \text{NSR}$$

where NSR has a value of about 1 when the portion comprises essentially background noise.



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where NSR is the square root of background noise energy divided by signal energy when the portion comprises speech, and where C is in the range of 0 through 1.

**Claim 36 (original):** The noise attenuation system according to Claim 35, where C is in the range of about 0.4 through about 0.6 when one of the encoder and the decoder adjusts the gain by the gain factor.

**Claim 37 (original):** The noise attenuation system according to Claim 35, where C is in the range of about 0.2 through about 0.4 when the encoder and the decoder adjust the gain by the gain factor.

**Claim 38 (currently amended):** The noise attenuation system according to Claim 35, further comprising a voice activity detector (VAD) operatively connected to at least one of the encoder and the decoder, the VAD to determine when the portion comprises speech.

**Claim 39 (original):** The noise attenuation system according to Claim 34, where the gain factor is based on a running mean.

**Claim 40 (original):** The noise attenuation system according to Claim 39, where the running mean  $Gf_{new}$  is determined by the equation,

$$Gf_{new} = \alpha \cdot Gf_{old} + (1 - \alpha) \cdot Gf_{current}$$

where  $Gf_{old}$  is a preceding gain factor for a preceding portion of the digitized signal, where

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$G_{f_{current}}$  is the gain factor based on the portion of the digitized signal, and where  $0 \leq \alpha < 0.5$ .

**Claim 41 (original):** The noise attenuation system according to Claim 40, where  $\alpha$  is equal to about 0.5.

**Claim 42 (original):** The noise attenuation system according to Claim 30, where the portion of the digitized signal is one of a frame, a sub-frame, and a half frame.

**Claim 43 (original):** The noise attenuation system according to Claim 30, further comprising:

an analog-to-digital converter disposed to receive and convert an analog signal into the digitized signal; and

a preprocessor operatively connected to provide the digitized signal from the analog-to-digital converter to the encoder, the preprocessor to modify spectral magnitudes of the digitized signal to reduce noise.

**Claim 44 (original):** The noise attenuation system according to Claim 30, where at least one of the encoder and the decoder comprises a digital signal processing (DSP) chip.

**Claim 45 (currently amended):** A method of attenuating noise in a speech coding system, comprising:

- (a) segmenting a digitized signal into at least one portion;

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- (b) determining at least one gain scaling the digitized signal within the one portion;
- (c) adjusting the at least one gain as a function of noise characteristic; and
- (d) quantizing the at least one gain into a group of at least one bit for a bitstream,

where the at least one gain is adjusted as a function of noise characteristic for attenuating background noise in at least one frame,

wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

**Claim 46 (original):** The method of attenuating noise according to Claim 45, where the speech coding system comprises code excited linear prediction (CELP).

**Claim 47 (original):** The method of attenuating noise according to Claim 45, where the speech coding system comprises extended code excited linear prediction (eX-CELP).

**Claim 48 (original):** The method of attenuating noise according to Claim 45, where step (a) further comprises:

- sampling an analog signal to produce the digitized signal; and
- modifying the spectral magnitudes of the digitized signal to reduce noise.

**Claim 49 (currently amended):** The method of attenuating noise according to Claim 45, where step (c) further comprises adjusting the at least one gain according to [[a]] the gain factor.

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**Claim 50 (original):** The method of attenuating noise according to Claim 49, where the gain factor  $G_f$  is determined by the equation

$$G_f = 1 - C \cdot \text{NSR}$$

where NSR has a value of about 1 when the portion comprises essentially background noise, where NSR is the square root of background noise energy divided by signal energy when the portion comprises speech, and where  $C$  is in the range of 0 through 1.

**Claim 51 (original):** The method of attenuating noise according to Claim 49, where the gain factor is based on a running mean,

**Claim 52 (original):** The method of attenuating noise according to Claim 51, where the running mean  $G_{f_{\text{new}}}$  is determined by the equation,

$$G_{f_{\text{new}}} = \alpha \cdot G_{f_{\text{old}}} + (1 - \alpha) \cdot G_{f_{\text{current}}}$$

where  $G_{f_{\text{old}}}$  is a preceding gain factor for a preceding portion of the digitized signal, where  $G_{f_{\text{current}}}$  is the gain factor based on the portion of the digitized signal, and where  $0 \leq \alpha < 1$ .

**Claim 53 (original):** The method of attenuating noise according to Claim 52, where  $\alpha$  is equal to about 0.5.

**Claim 54 (original):** The method of attenuating noise according to Claim 45, where the portion is one of a frame, a sub-frame, and a half frame.

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**Claim 55 (currently amended):** A method of attenuating noise in a speech coding system, comprising:

- (a) decoding at least one gain from a group of at least one bit in a bitstream;
- (b) adjusting the at least one gain as a function of noise characteristic; and
- (c) assembling the at least one gain into a portion of a reconstructed speech signal, where the at least one gain is adjusted as a function of noise characteristic for attenuating background noise in at least one frame,  
wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

**Claim 56 (original):** The method of attenuating noise according to Claim 55, where the speech coding system comprises code excited linear prediction (CELP).

**Claim 57 (original):** The method of attenuating noise according to Claim 55, where the speech coding system comprises extended code excited linear prediction (eX-CELP).

**Claim 58 (currently amended):** The method of attenuating noise according to Claim 55, where step (b) further comprises adjusting the at least one gain according to [[a]] the gain factor.

**Claim 59 (original):** The method of attenuating noise according to Claim 58, where the

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gain factor  $G_f$  is determined by the equation

$$G_f = 1 - C \cdot \text{NSR}$$

where NSR has a value of about 1 when the portion comprises essentially background noise, where NSR is the square root of background noise energy divided by signal energy when the portion comprises speech, and where  $C$  is in the range of 0 through 1.

**Claim 60 (original):** The method of attenuating noise according to Claim 58, where the gain factor is based on a running mean.

**Claim 61 (original):** The method of attenuating noise according to Claim 60, where the running mean  $G_{f_{\text{new}}}$  is determined by the equation,

$$G_{f_{\text{new}}} = \alpha \cdot G_{f_{\text{old}}} + (1 - \alpha) \cdot G_{f_{\text{current}}}$$

where  $G_{f_{\text{old}}}$  is a preceding gain factor for a preceding portion of the digitized signal, where  $G_{f_{\text{current}}}$  is the gain factor based on the portion of the digitized signal, and where  $0 \leq \alpha < 1$ .

**Claim 62 (original):** The method of attenuating noise according to Claim 61, where  $\alpha$  is equal to about 0.5.

**Claim 63 (currently amended):** A method of attenuating noise in a speech coding system, comprising:

- (a) segmenting a digitized signal into at least one portion;
- (b) determining at least one gain representing the digitized signal within the one

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portion;

- (c) pre-adjusting the at least one gain as a function of noise characteristic;
- (d) quantizing the at least one gain into a group of at least one bit for a bitstream.
- (e) decoding the at least one gain from the group of at least one bit in the bitstream;
- (f) post-adjusting the at least one gain as a function of noise characteristic; and
- (g) assembling the at least one gain into a reconstructed speech signal,

where the at least one gain is adjusted as a function of noise characteristic for attenuating background noise in at least one frame,

wherein the at least one gain is adjusted according to a gain factor, the gain factor facilitating time-domain background noise attenuation.

**Claim 64 (original):** The method of attenuating noise according to Claim 63, where the speech coding system comprises code excited linear prediction (CELP).

**Claim 65 (original):** The method of attenuating noise according to Claim 63, where the speech coding system comprises extended code excited linear prediction (eX-CELP).

**Claim 66 (currently amended):** The method of attenuating noise according to Claim 63, where at least one of (c) and (f) further comprises adjusting the at least one gain according to ~~[[a]]~~ the gain factor.

**Claim 67 (original):** The method of attenuating noise according to Claim 66, where the

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gain factor  $G_f$  is determined by the equation

$$G_f = 1 - C \cdot \text{NSR}$$

where NSR has a value of about 1 when the portion comprises essentially background noise, where NSR is the square root of background noise energy divided by signal energy when the portion comprises speech, and where  $C$  is in the range of 0 through 1.

**Claim 68 (original):** The method of attenuating noise according to Claim 66, where the gain factor is based on a running mean.

**Claim 69 (original):** The method of attenuating noise according to Claim 68, where the running mean  $G_{f_{\text{new}}}$  is determined by the equation,

$$G_{f_{\text{new}}} = \alpha \cdot G_{f_{\text{old}}} + (1 - \alpha) \cdot G_{f_{\text{current}}}$$

where  $G_{f_{\text{old}}}$  is a preceding gain factor for a preceding portion of the digitized signal, where  $G_{f_{\text{current}}}$  is the gain factor based on the portion of the digitized signal, and where  $0 \leq \alpha < 1$ .

**Claim 70 (original):** The method of attenuating noise according to Claim 69, where  $\alpha$  is equal to about 0.5.